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Palaeohydrology of a 3D-maze cave (Hermannshöhle, Lower Austria)

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The 4.4 km-long Hermannshöhle (located in Kirchberg/Wechsel, Lower Austria) is one of the largest caves in the Lower Austroalpine Unit. It is developed in an isolated block of carbonate marble, taking up only 140 x 160 m of ground area and 73 m of elevation difference. The cave is unusual in two respects: (a) its dense network of corridors is arranged in a three-dimensional maze and (b) the most outstanding macro- and micromorphologic features were caused by paragenesis.

Speleothems are abundant throughout the cave comprising flowstones, dripstones, helictites, popcorn, calcite rafts, a shield, and moonmilk. Even though most passages are canyon-shaped, the cave shows exclusively phreatic features. Sediment fills are abundant as well, mostly covering the floor of passages to an unknown depth, containing mainly allochthonous material, i.e. schists and gneisses.

Besides some vadose dripwater the cave is dry today. A conspicuous feature is the lack of a single water path and instead a maze with multiple flow paths formed. Another interesting feature is that one part of the cave developed below the nearby Ramsbach brook but is still dry. There are small ponors reported from the Ramsbach brook (which were observed during river regulation) indicating an actively draining karst system, which is not yet explored.

The aim of this study was to enlighten the palaeohydrology of this cave using morphological and sedimentological observations as well as U/Th dating of speleothems. First results show that the palaeo-environment and the hydrologic setting of the Hermannshöhle were drastically different from today. Undersaturated water sourced from nearby non-karstic gneisses and schists gave rise to well-developed contact karst features. Surprisingly the palaeo flow direction deduced from indicators like scallops and sediment structures was opposite to the flow direction of the present nearby brooks (Rams- and Feistrizbach). Following pulses of clastic sediment input a distinct system of paragenetic canyons developed creating the unique maze character of the cave.